

Claims

1. An apparatus for cleaning exhaust gases from an internal combustion engine (1), in particular a Diesel engine, having an exhaust gas line (7), leading away from the engine (1), and an ozone source (5) for enriching the exhaust gas stream of the engine with ozone, characterized in that

the ozone source (5) is embodied for generating a continuous ozone-containing gas stream, such that particles flowing in the exhaust gas line (7) are to a large extent oxidized.

2. The apparatus of claim 1, characterized in that the ozone source (5) is disposed in the exhaust gas line (7), and the ozone generation is effected in the exhaust gas stream flowing through.

3. The apparatus of claim 1, characterized in that the ozone source (5) has an intake line (15), a reaction chamber (16), and a supply line (9), and oxygen-containing gas is delivered to the reaction chamber (16) via the intake line (15) and in the reaction chamber (16) is enriched with ozone, preferably by energy input, and is introduced via the supply line (9) into the exhaust gas line (7).

4. The apparatus of one of the foregoing claims, characterized in that an oxidizing catalytic converter (2) is disposed in the exhaust gas line (7), and the enrichment of the exhaust gas stream with ozone is effected upstream of the oxidizing catalytic converter (2).

5. A motor vehicle having an internal combustion engine (1), in particular having a Diesel engine, which contains an apparatus for exhaust gas cleaning of one of the foregoing claims.

6. A method for cleaning the exhaust gas stream in the exhaust gas line (7) of an internal combustion engine (1), in particular a Diesel engine, of particles such as soot, the exhaust gas stream being enriched with ozone, characterized in that a continuous enrichment of the exhaust gas stream with ozone is effected such that particles that are present are to a great extent oxidized even during the flow through the exhaust gas line (7).
7. The method of claim 6, characterized in that the concentration of the ozone is determined essentially as a function of the particle stream, and the concentration of the ozone is selected in particular such that the remaining particle content of the exhaust gas stream does not exceed a predetermined limit value.
8. The method of claim 6 or 7, characterized in that for the ozone enrichment, oxygen present in the exhaust gas stream and/or water is used.
9. The method of claim 6 or 7, characterized in that the generation of the ozone is effected in a reaction chamber (16) outside the exhaust gas stream.
10. A method for regenerating a particle filter (3) in an apparatus for cleaning the exhaust gas from an internal combustion engine (1), having an ozone source (5) for enriching the exhaust gas stream in an exhaust gas line (7) upstream of the particle filter (3), characterized in that after the engine (1) has been shut off, ozone is generated in the ozone source (5) and introduced into the exhaust gas line (7) in the region of the particle filter (3).
11. The method of claim 10, characterized in that the ozone concentration on or in the particle filter (3) is increased until the self-ignition of the deposited particles.

12. The method of claim 10 or 11, characterized in that by means of a blower (17), an ozone-enriched gas flow through the particle filter (3) is generated.
13. The method of one of claims 10 through 12, characterized in that the ozone delivery is regulated on the basis of the temperature of the particle filter (3).
14. A method for operating an apparatus for cleaning exhaust gases in an exhaust gas line (7) of an internal combustion engine (1), in which a gas stream enriched with ozone is generated in an ozone source (5),
characterized in that
the exhaust gas line (7) is rinsed at least partially with the gas enriched with ozone, before the engine (1) is started.
15. The method of claim 14, characterized in that the gas stream is introduced into the exhaust gas line (7) upstream of an oxidizing catalytic converter (2), and at least the oxidizing catalytic converter (2) is rinsed with the ozone-enriched gas before the engine (1) is started.
16. The method of claim 15, characterized in that immediately after the engine (1) is started, the combustion in the engine is controlled such that the exhaust gases still contain combustible hydrocarbons.
17. The method of one of claims 14 through 16, characterized in that until the operating temperature of the oxidizing catalytic converter (2) is reached, an enrichment, in particular a degressive enrichment, of the exhaust gas stream with ozone generated by the ozone source (5) is effected.
18. The method of one of claims 14 through 17, characterized in that the rinsing with ozone-enriched gas is effected during the preglow phase of the Diesel engine.

19. A motor vehicle having an internal combustion engine, in particular a Diesel engine, having a control unit (6) for controlling at least the combustion process of the engine (1), with a computation device, in particular a microprocessor, for performing a method of one of claims 6 through 18.